CLAIMS

We claim:

1. A CDMA receiving system comprising:

a receiver that is configured to receive a composite signal that includes a plurality of information signals,

a first correlator, operably coupled to the receiver, that is configured to decode a first information signal from the composite signal, based on a first CDMA code, to produce a first output signal,

a second correlator, operably coupled to the receiver, that is configured to decode a second information signal from the composite signal, based on a second CDMA code, to produce a second output signal, and

a decorrelator, operably coupled to the first correlator and the second correlator that is configured to determine a first output value and a second output value corresponding to the first information signal and the second information signal, respectively, based on the first output signal, the second output signal, and a correlation between the first CDMA code and the second CDMA code.

2. The system of claim 1, further including:

at least one other correlator, operably coupled to the receiver and to the decorrelator, that is configured to decode at least one other information signal from the composite signal, based on at least one other CDMA code, to produce an at least one other output value,

wherein

the decorrelator is further configured to determine the first output value, the second output value, and at least one other output value, corresponding to the first information signal, the second information signal, and the at least one other information signal, respectively, based on the first output signal, the second output signal, the at least one other output signal, and a correlation among the first CDMA code, the second CDMA code, and the at least one other CDMA code.

3. The system of claim 1, wherein

the composite signal is represented as r, and the first code and second code are represented as C1 and C2, respectively,

the first output signal y1, and the second output signal y2 are determined as:

$$\begin{bmatrix} y1 \\ y2 \end{bmatrix} = \begin{bmatrix} r \bullet C1 \\ r \bullet C2 \end{bmatrix};$$

the correlation R is determined as:

$$R = \begin{bmatrix} C1C1 & C1C2 \\ C2C1 & C2C2 \end{bmatrix}; \text{ and}$$

the first output value z1 and second output value z2 are determined as:

$$\begin{bmatrix} z1 \\ z2 \end{bmatrix} = R^{-1} \begin{bmatrix} y1 \\ y2 \end{bmatrix}.$$

4. The system of claim 1, further comprising:

a plurality of fingers, each finger corresponding to a different phase delay, and each configured to provide an intermediate first output value and second output value corresponding to the phase delay of the finger, and

a multipath processor,

wherein

a first finger of the plurality of fingers includes the first correlator, the second correlator, and the decorrelator, such that the first output value and second output value correspond to the first intermediate output value and second intermediate output value of the first finger,

each of the other fingers also includes an other first correlator, an other second correlator, and an other decorrelator, and

the multipath processor determines a first output symbol and a second output symbol based on the intermediate first output values and second output values of the plurality of fingers.

5. The system of claim 1, wherein

the correlation between the first CDMA code and the second CDMA code is independent of a phase of the first and second CDMA code.

6. The system of claim 1, wherein

the correlation between the first CDMA code and the second CDMA code is independent of the first information signal and the second information signal.

7. The system of claim 1, wherein

the first CDMA code has a first length that is longer than a second length of the second CDMA code, and

the correlation between the first CDMA code and the second CDMA code is based on correlations of segments of the first CDMA code and the second CDMA code.

8. The system of claim 7, wherein

the first correlator is configured to decode the first information signal by decoding segments of the composite signal corresponding to the second length, to produce segmented decodings based on the segments of the first CDMA code, and

the decorrelator is configured to determine the first output value by combining the segmented decodings corresponding to the first length.

9. A method for decoding a composite signal comprising:

determining a plurality of correlation outputs corresponding to a correlation between the composite signal and each of a plurality of CDMA codes,

determining a correlation matrix corresponding to a correlation among each of the plurality of CDMA codes, and

determining a plurality of output values, each output value corresponding to each of the plurality of CDMA codes, based on the plurality of correlation outputs and an inverse of the correlation matrix.

10. The method of claim 9, wherein

the correlation matrix is independent of a phase of the plurality of CDMA codes.

11. The method of claim 9, wherein

the correlation matrix is independent of the composite signal.

12. A CDMA receiving system comprising:

a receiver that is configured to receive a composite signal that includes a plurality of information signals,

a decoder, operably coupled to the receiver, that is configured to decode an information signal of the plurality of information signals,

wherein

the decoder decodes the information signal by separately decoding segments of the information signal using segments of a CDMA code that are shorter in length than the CDMA code, to produce an intermediate value corresponding to the information signal associated with each segment.

13. The system of claim 12, wherein

the decoder is further configured to form a composite of the intermediate values corresponding to each segment, to provide an output value corresponding to the information signal.

14. The system of claim 13, further including:

at least one other decoder that is configured to decode at least one other information signal using at least one other CDMA code.

15. The system of claim 14, wherein

the at least one other CDMA code has a length corresponding to the segments of the CDMA code.

16. The system of claim 14, further including

a decorrelator that is configured to provide the output value based on the intermediate values, an output of each of the at least one other decoder, and a correlation among the corresponding segment of the first CDMA code and each of the at least one other CDMA codes.

17. A method of decoding an information symbol from a composite signal, comprising

partitioning the composite signal into a plurality of segments, each segment of the plurality of segments being shorter in length than the information symbol, and

determining an output value corresponding to each segment, based on a correlation between the segment and a corresponding segment of a CDMA code having a same length as the information symbol.

18. The method of claim 17, further including

forming a composite of the output value of each segment, to determine an output symbol corresponding to the information symbol.

19. The method of claim 17, further including

determining an other output value from the composite signal based on an other CDMA code, and

modifying the output value and the other output value, based on an inverse of a correlation between the CDMA code and the other CDMA code.